Space Weather Technical Forecast

Issued on Friday, 05 August 2022 at 00:25 Local

This technical forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

Space Weather Forecast Headline: No significant activity.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been very low over the past 24 hours with only B-class flares. There are currently 3 numbered regions on the disc, two of which are are small, weak and magnetically stable. The largest region on the visible disc continues to be AR3068, an Esi/beta, which remains stable. No Earth-directed CMEs were observed.

Solar Wind / Geomagnetic Activity: The solar wind started at elevated levels, as measure at L1, under the residual influence of a high speed stream from coronal hole 7. The solar wind then gradually and erratically declined, having briefly peaked at 517 km/s at 04/0333 UTC, to end the day slightly elevated around 410 km/s. Density was average throughout. The total interplanetary magnetic field (IMF), Bt was weak, below 8 nT. The north-south component, Bz, fluctuated weakly between +5/-4 nT. The Phi angle was negative (towards the Sun). Geomagnetic activity was Quiet (Kp 1-2).

Energetic Particles / Solar Radiation: The high energy proton flux (10 MeV), as measured by GOES-16 was at background levels. The high energy electron flux (greater than 2 MeV) was at background to moderate levels, peaking at 298 pfu ay 04/1645 UTC. Electron fluence was steady, remaining well below the Active threshold (1e8 integrated flux), with an observed fluence value of 8.07e6 integrated pfu recorded at 05/0000 UTC.

Four-Day Space Weather Forecast Summary

Solar Activity: Very low or low solar activity is likely to continue for today and tomorrow, with a slight chance (10%) of an M-class flare. From day 3 an active region may rotate from the far side onto the visible disc, therefore the probability of significant flares increases slightly.

Solar Wind / Geomagnetic Activity: No CMEs have been assessed as Earth-directed. Initially slightly elevated solar winds will continue to gradually decline through today and most of tomorrow, reaching background levels. Then from late tomorrow (6th) a new HSS is expected to arrive. As solar wind speeds strengthen, so the geomagnetic activity increases. Geomagnetic activity should remain Quiet with a chance of Unsettled intervals today and for much of tomorrow (6th), then increasing Unsettled to Active (Kp 3-4) later tomorrow and overnight into day 3 (7th), with a chance of isolated G1/Minor geomagnetic storm (Kp 5) intervals occurring. Through day 4 (8th) activity is expected to decline to mainly Quiet levels (Kp 1-2).

Energetic Particles / Solar Radiation: The high energy proton flux (greater than 10 MeV) is expected to remain at background levels. The high energy electron flux (greater than 2 MeV) is expected to remain mostly at background to moderate levels, but with a chance of approaching high levels at the diurnal maxima during day 4 (8th).

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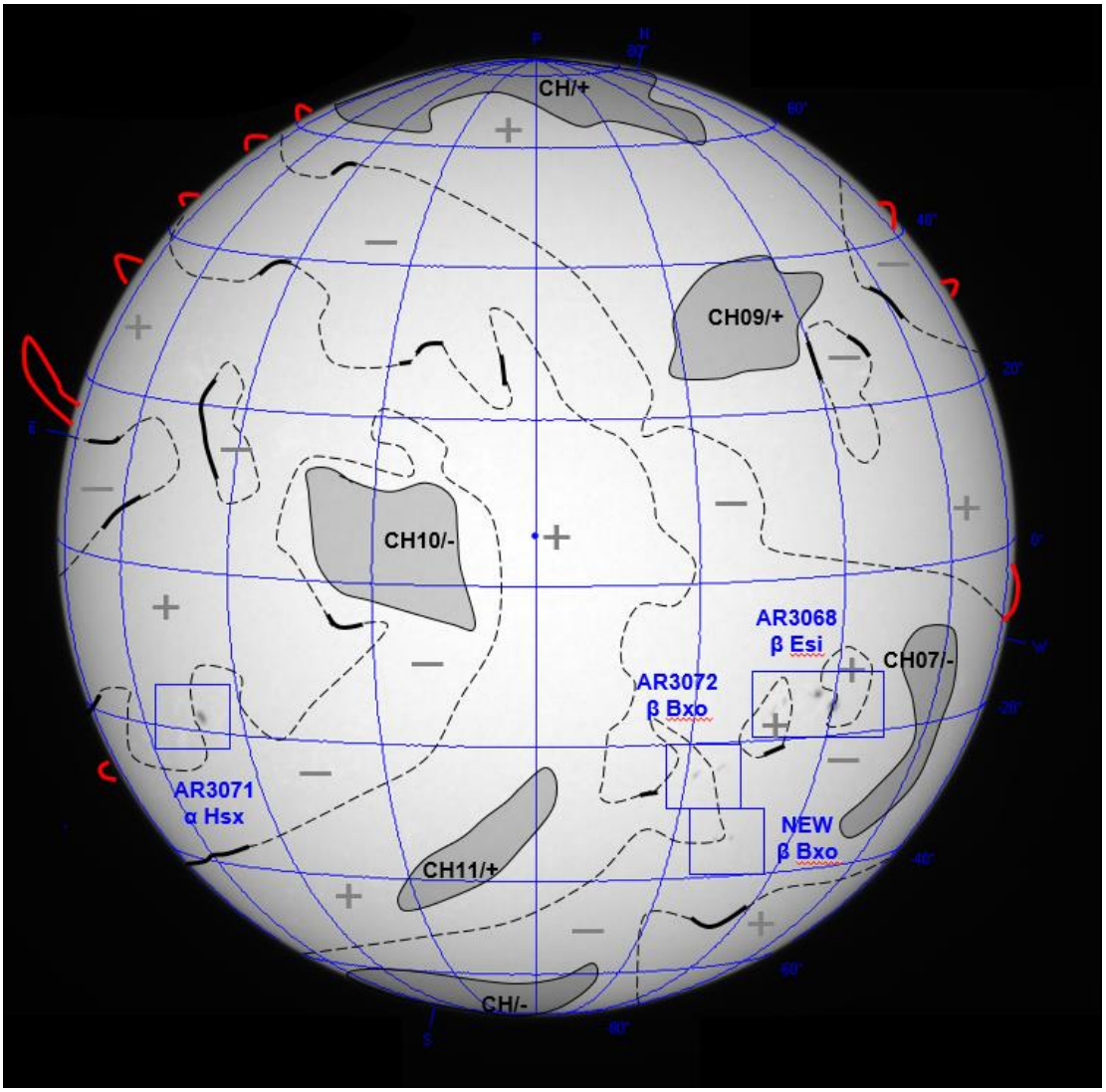
The corresponding 24 hour fluence is most expected to remain below the Active threshold (1e8 integrated pfu), with initially a steady trend but then an increasing trend through day 4 (8th).

Figure 1. Solar Analysis Valid 04/1924 UTC.



Key: Filament ___ , Prominence ___ , Magnetic Field Line - - - , Polarity +/-, Coronal Holes: Grey shaded area CHxx +/-, Sunspot groups 25xx - Mt Wilson α-β-βγ-βγδ and Zurich-McIntosh Axx etc.

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Geomagnetic Storms:

No Earth directed CMEs are currently expected. Earth is currently gradually exiting the High Speed Stream of CH07/-, with initially slightly elevated solar winds but these declining to background levels through today and much of tomorrow (6th). Then from late tomorrow (6th) a new HSS is expected to arrive, from CH09/+. Although this feature appears weak in the below imagery, recent solar wind data from Stereo Ahead indicates that solar winds may increase to 500-550 km/s after a potentially significant CIR (Co-rotating interaction region).

Geomagnetic activity should remain Quiet (Kp 0-2) with a chance of Unsettled (Kp 3) intervals today and for much of tomorrow (6th), then increasing Unsettled to Active (Kp 3-4) later tomorrow and overnight into day 3 (7th), with a chance of isolated G1/Minor geomagnetic storm (Kp 5) intervals occurring. Through day 4 (8th) activity is expected to decline to mainly Quiet levels (Kp 1-2).

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	1	50	40	10
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Figure 2: NOAA GOES EAST SUVI 195 image with coronal holes.

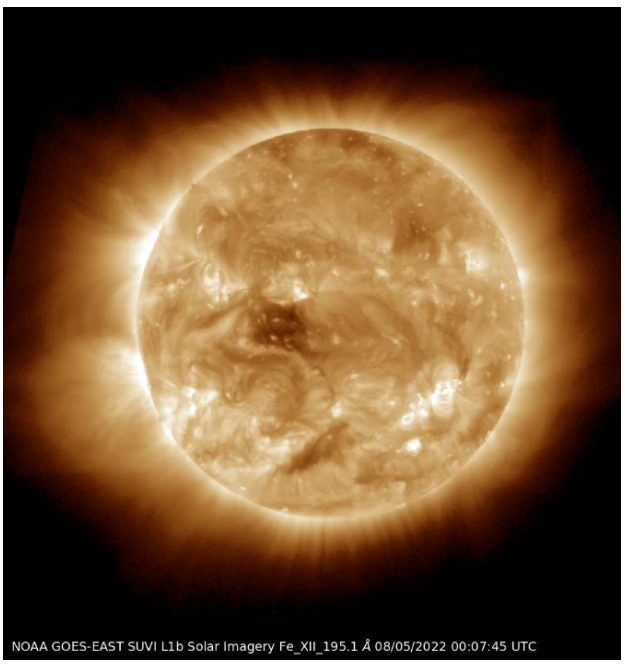

Figure 3: STEREO A mag and plastic for the past 3 days.

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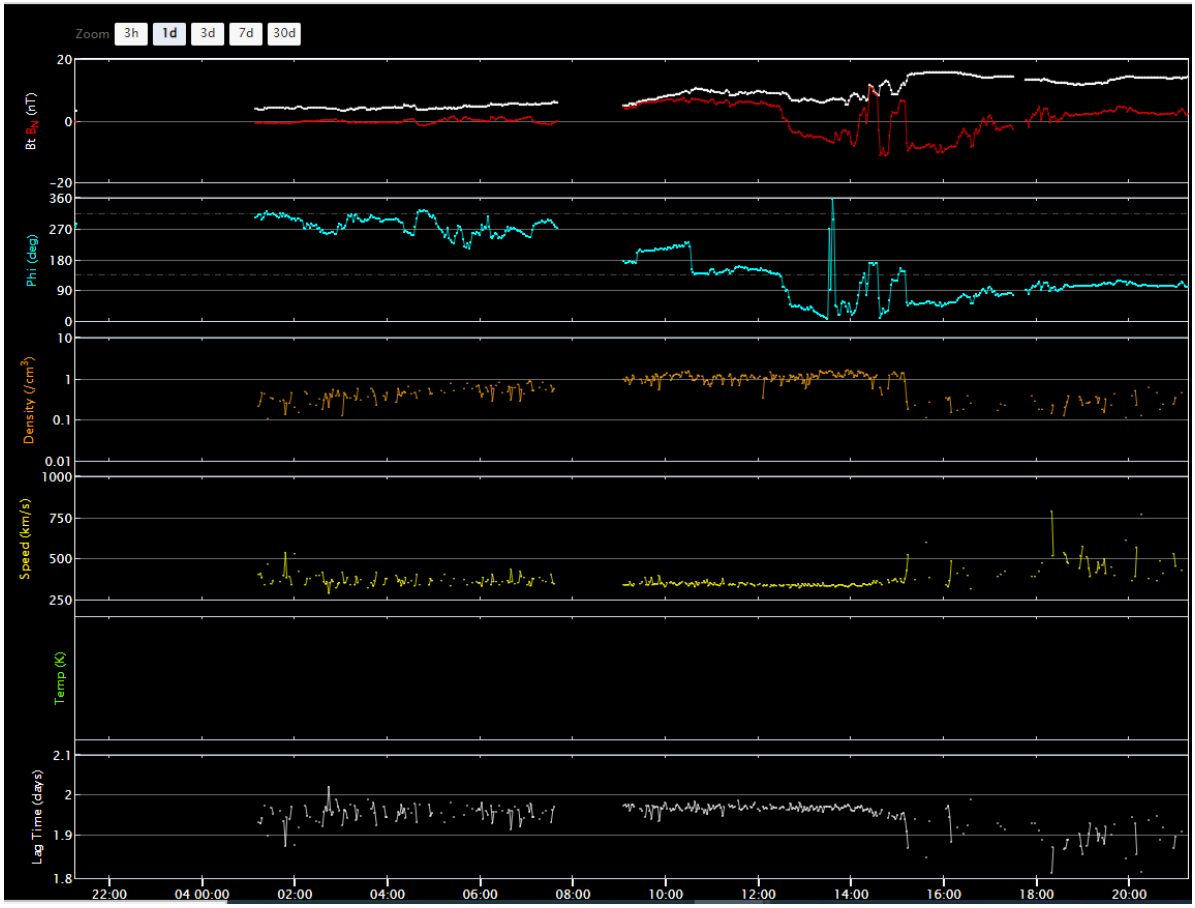

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Met Office Space Weather Technical Forecast

Radio Blackouts - X-Ray Flares:

Solar activity has been very low over the past 24 hours with only B-class flares. There are currently 3 numbered regions on the disc,; AR3071 and AR3072 small, weak and magnetically stable. The largest region on the visible disc continues to be AR3068, an Esi/beta, which remains stable.

Very low or low solar activity is likely to continue for today and tomorrow, with a slight chance (10%) of an M-class flare. From day 3 an active region may rotate from the far side onto the visible disc, therefore the probability of significant flares increases slightly towards the end of the forecast period.

X Ray Flares	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability			(%)	(%)	(%)	(%)
Active	R1-R2 M Class	No	10	10	20	30
Very Active	R3 to R5 X Class	No	1	1	1	1

Solar Radiation Storms - (High Energy Protons):

The high energy proton flux (greater than 10 MeV) is currently at Background levels and is expected to remain at this level through the period. AR3068 will need monitoring for any further development, however, with the potential to increase radiation storm risks as it transits across the western hemisphere of the solar disc.

Radiation Storms	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability (Exceedance)			(%)	(%)	(%)	(%)
Active	≥ S1	No	1	1	1	1
Very Active	≥ S3 *	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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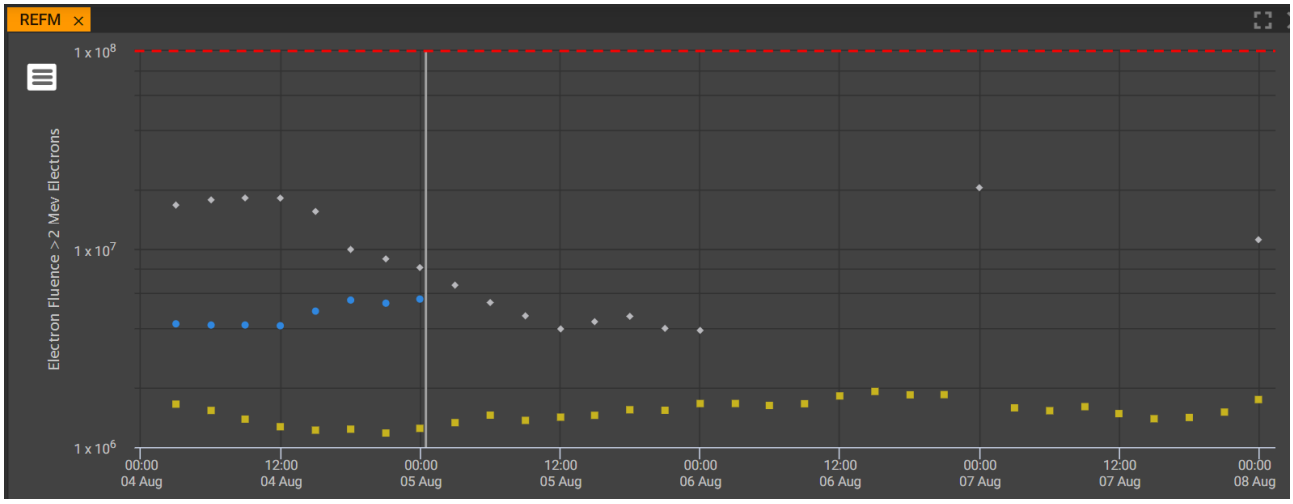
High Energy Electrons Event (≥ 2MeV):

The high energy electron flux (greater than 2 MeV) as measured by GOES-16, is expected to remain mostly at background to moderate levels, but with a chance of approaching high levels at the diurnal maxima during day 4 (8th). The corresponding 24 hour fluence is most expected to remain below the Active threshold (1e8 integrated pfu), with initially a steady trend but then an increasing trend through day 4 (8th)

Despite the Met Office REFM output currently over estimating the electron fluence, the overall guidance of the model is considered good, with the forecast fluence remaining below the Active threshold for days 1-3 (6-8th).

GEO Electron Environment	Level (cm^{-2} sr^{-1} day^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC)	Day 2 (00-24 UTC)	Day 3 (00-24 UTC)	Day 4 (00-24 UTC)
Probability (Exceedance)			(%)	(%)	(%)	(%)
Active	≥ 2 MeV ≥ $1x10^8$	No	5	5	10	30
Very Active	≥ 2 MeV ≥ $1x10^9$	No	1	1	1	1

Figure 4: Met Office REFM model.



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